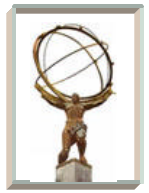


U.S. ATLAS Software Project

Torre Wenaus

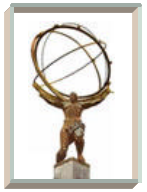
BNL

DOE/NSF Review of U.S. ATLAS and CMS Computing Projects

Brookhaven National Laboratory

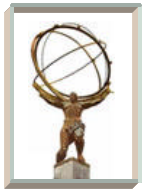
NOVEMBER 14-17, 2000

Outline



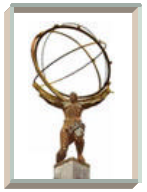
- U.S. ATLAS Software Project Objectives
- Project Plan
  - Technical Scope
  - WBS and project planning
  - Organization (U.S., and relation to international ATLAS)
- Activities Overview
  - Core software, subsystem software, other activities
- Schedule
- Budget and Personnel
- Summary

U.S. ATLAS Software Objectives



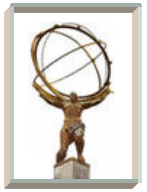
- Play major roles in limited but key core software domains
  - Which leverage unique U.S. capabilities & experience for ATLAS
  - Which are central to U.S. physics analysis capability
- Play major subsystem software roles in areas complementing U.S. hardware responsibilities
- Closely couple core development to subdetector software activities
  - Real world testing and feedback in a tight development cycle
- Establish leadership roles commensurate with our activities
- Scope overall level of participation to level commensurate with overall U.S. participation in ATLAS: ~20% of overall software effort

Project Plan: Technical Scope



- Two focus areas in core software
  - Control framework and overall offline software architecture
    - Bulk of control framework effort taken up by U.S. for International ATLAS, and currently a leadership role in architecture
  - Databases and data management
    - Major roles for U.S. in International ATLAS program
      - Project management
      - Development of databases and data management
    - Also responsible for delivering database and data management capability required for U.S. development and analysis efforts
- Support for software development and physics analysis
  - Software librarian, core support to subsystem developers, quality control, software development tools, training, collaborative tools,…

U.S. ATLAS Software WBS



- ATLAS-wide PBS/WBS in development, in cooperation with U.S. and using U.S. tools
- Original Int'l ATLAS PBS taken as input (with other sources, e.g. Malon, Quarrie) to U.S. ATLAS WBS in development
  - Comprehensive, not U.S. only, but will discriminate areas of U.S. activity
- Agreement with McCubbin/Meinhard to
  - Use this as basis for Int'l ATLAS
  - Allowing for distinct 'projections' for U.S., Int'l ATLAS out of common source
- U.S. ATLAS software WBS matches ATLAS's where possible and cross-references ATLAS's throughout
- Included in your package

Software WBS from level 2.2 (/sw)

Created Mon Nov 13 16:55:43 GMT-0500 (Eastern Standard Time) 2000

WBS Num	Description	ATLAS WBS
2.2	**Software Projects**	3

ID: /sw Funded: Both U.S.Mgr: T.Wenaus U.S.Contact: T.Wenaus **US: yes**
Software projects that are part of the overall ATLAS (in some cases also LHC) effort. This work includes contributions to projects that the U.S. takes on as part of an overall MOU with ATLAS for software deliverables. In distinction, there is software effort associated with the regional centers -- mainly facility infrastructure software and support for third party tools -- which fall under the Facilities subproject (WBS 2.3)

2.2.1	**Core Software**	3.1

ID: /sw/core Funded: Both Contact: N.McCubbin U.S.Contact: T.Wenaus **US: yes**
Non detector specific software efforts which are part of the core ATLAS offline computing infrastructure.
The scope includes development, support (including the provision of user support) and maintenance.

2.2.2	**Simulation and Reconstruction**	

ID: /sw/simrec Funded: Both U.S.Contact: T.Wenaus **US: yes**
Software for the (post-generator) simulation and reconstruction of ATLAS events.
1999/9/1: Reconstruction
2000/12/1: ASTRA in new framework
2000/12/31: 'New' reconstruction running in Athena
2001/3/1: Production of simulated data
2004/7/30: Test full chain in real environment

2.2.3	**Collaborative tools**	

ID: /sw/collab Funded: Both U.S.Mgr: T.Wenaus U.S.Contact: T.Wenaus **US: yes**
Tools that allow collaboration from remote sites, including videoconferencing, electronic notebooks, grid services, etc.

2.2.4	**Software support**	4

ID: /sw/support Funded: Both U.S.Mgr: T.Wenaus U.S.Contact: T.Wenaus **US: yes**
Installation, support, and help desk for U.S. installations of ATLAS offline software. U.S. ATLAS software librarian.
Tools supporting software development.

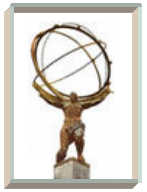
2.2.5	**Training**	

ID: /sw/train Funded: Both U.S.Mgr: F.Merritt U.S.Contact: F.Merritt **US: yes**
Training of physicists, software professionals and students in software tools and methodologies, languages, ATLAS specific software packages, etc.
Merritt (Chicago) 0/0.1 1/0.1 2/0.1 3/0.1 4/0.1 5/0.1

2.2.6	**Data production**	6

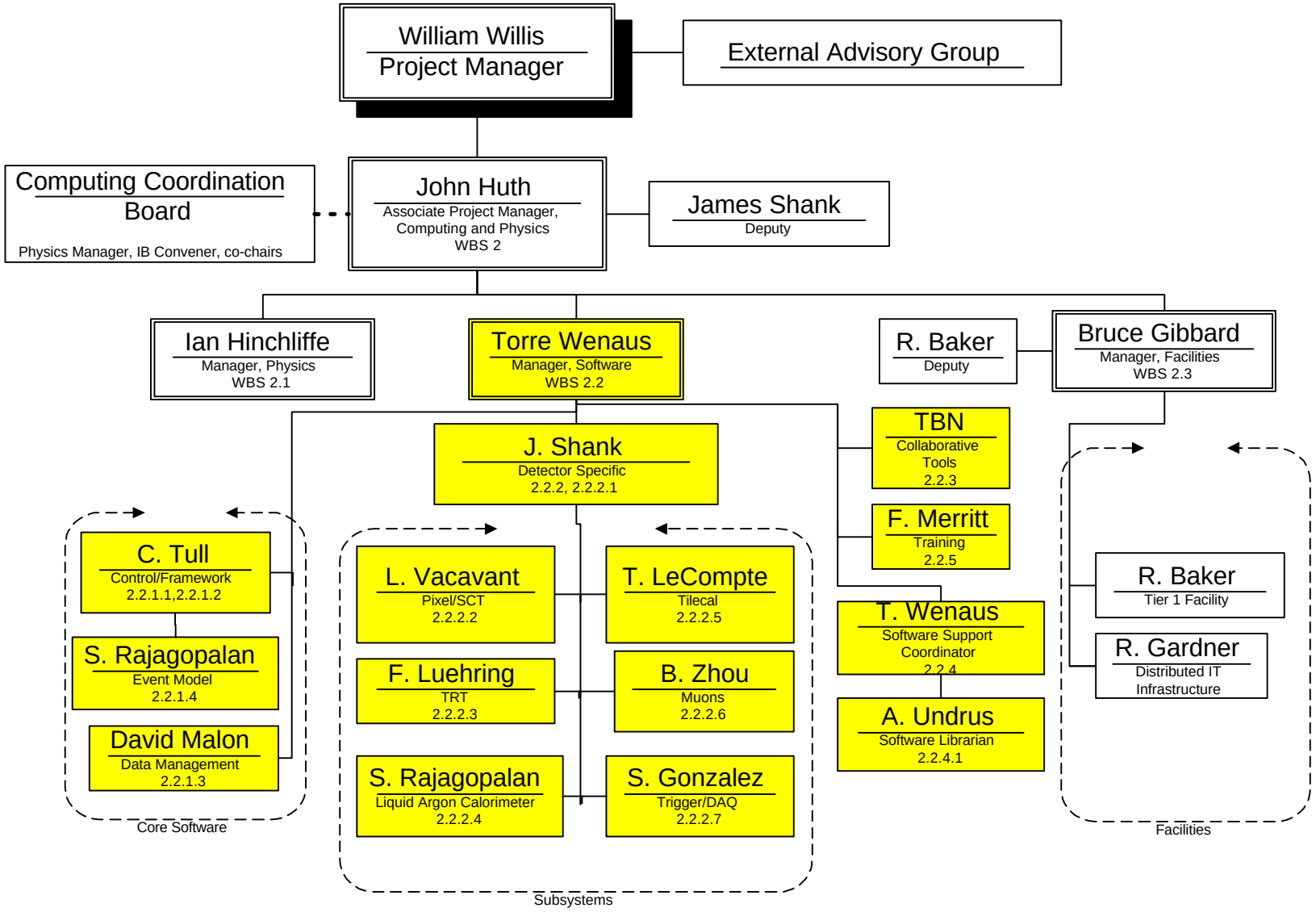
ID: /sw/prod Funded: Both U.S.Mgr: T.Wenaus U.S.Contact: T.Wenaus **US: yes**

Software Project Planning

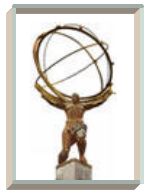


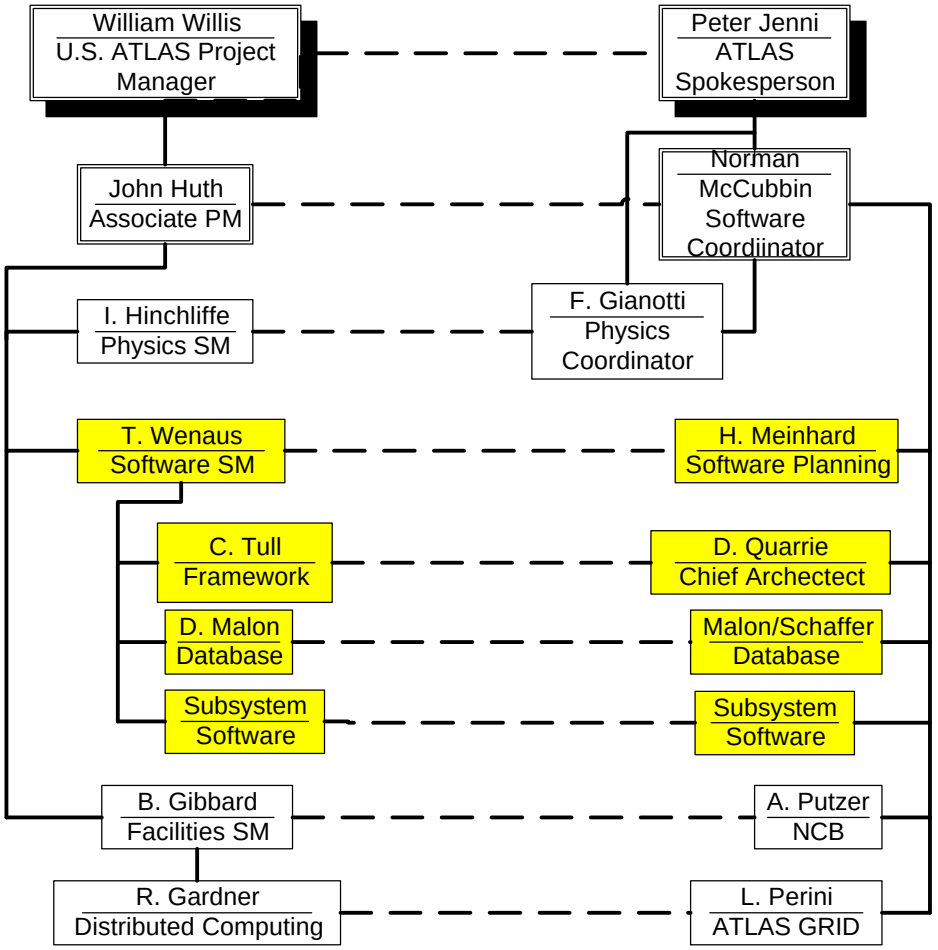
- WBS, schedule, personnel info implemented as simple, easily maintained text files
  - Maintained in the ATLAS CVS repository
  - WBS and schedule ATLAS-wide; personnel is U.S.-only
- Text sources processed by home-grown software 'XProject'
  - Text source converted to XML conforming to an XProject DTD by perl script
  - XML is parsed and processed by a Java program
  - Builds object collections for WBS, sched, personnel
  - These are used to generate needed outputs
    - Static and dynamic (Java servlet) web pages showing project info, filtering on dates, tags, WBS nos., etc.
    - Input (CSV) files for U.S. ATLAS Project Office:
      - Access databases for manpower, WBS
      - Microsoft Project

U.S. ATLAS Software Organization

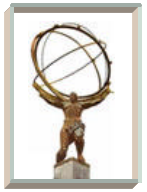


U.S. ATLAS - ATLAS Coordination





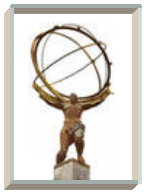
ATLAS Detector/Task Matrix



	Offline Coordinator	Reconstruction	Simulation	Database
Chair	N. McCubbin	D. Rousseau	K. Amako	**D. Malon**/ R.D. Schaffer
Inner Detector	D. Barberis	D. Rousseau	**F. Luehring**	S. Bentvelsen
Liquid Argon	J. Collot	**S. Rajagopalan**	**M. Leltchouk**	**S. Simion**/ R. Sobie
Tile Calorimeter	A. Solodkov	**F. Merritt**	A. Solodkov	**T. LeCompte**
Muon	G. Poulard	J.F. Laporte	A. Rimoldi	**S. Goldfarb**
LVL 2 Trigger/ Trigger DAQ	S. George	S. Tapprogge	T. Hansl-Kosenecki	H. P. Beck
Event Filter	V. Vercesi	F. Touchard		

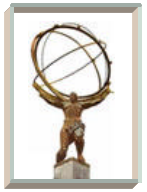
U.S. people highlighted

Activities Overview



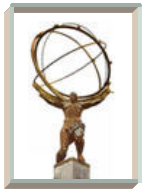
- Control Framework and Architecture
- Databases and Data Management
- Support, training and collaborative tools
- Subdetector Software

Control Framework and Architecture



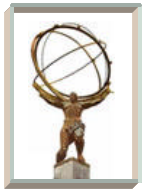
- Architecture Team established in early 2000 with strong LBNL role (Calafiura, Tull, Quarrie of 7 members total), to develop the ATLAS framework
- D. Quarrie named ATLAS Chief Architect
- Aggressive initial milestone of May pre-Alpha release (Athena) met successfully
  - Athena development strongly focused at LBNL
  - Strong U.S. role in integration, testing, evaluation; but also wide evaluation & use in Int'l ATLAS
  - Currently under detailed review by ATLAS
  - Alpha version recently released
- Working closely with BNL on Event Model, ANL on DB related
- Core presence at CERN (C. Tull) for the next year -- requesting support for permanent core presence
- Critical mass of of physicists and developers from LBNL and BNL established – and must be preserved

Databases and Data Management



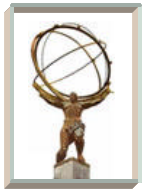
- Critical area in ATLAS, with uncertainties e.g. in long term technology remaining
- Complicated by competing/shifting priorities in a very broadly defined and largely immature DB effort (e.g. test beam support; framework integration; hit/digis in Objy; ROOT based persistency; Objy infrastructure *prerequisites* to deployment)
- U.S. has a strong managerial and technical voice and role in D. Malon, Co-Leader of Databases
  - But to date not supported by developer critical mass to drive deliverables and go from *talk* to *code and capability*
    - Need to complement and strengthen a managerial voice with an ability to deliver on *core* database deliverables
  - David spends much time in fire-fighting mode as one of the *technically* able few in ATLAS
  - Continuing problems with completing ANL DB hires

Support, Collaboration, Training



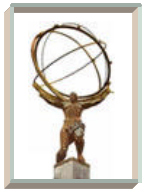
- Full time U.S. ATLAS software librarian at BNL
  - U.S. installations of CVS repository, releases, external libraries and tools; Solaris, Linux platform support
  - 'Help ticket' system shared with Tier 1 facility
- Syncomat based Geant4 training series on web in development (U Mich)
  - Sample lectures on web:
    - http://um-captest.ummu.umich.edu/atlas/geant4/
- Successful Advanced OO Design course (Object Mentor) in March
- Training focus since May has been on new Athena framework
  - Course development and courses led by A Team
  - Application integration tutorial from LAr reconstruction team
  - Tutorials at LBNL (May/35 attendees), CERN (May/18, July/17)

Subdetector Software



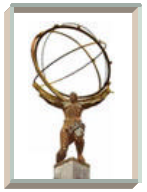
- Brief survey of subdetector software recent activities and near-term plans
  - Silicon Tracker
  - Transition Radiation Tracker (TRT)
  - Liquid Argon Calorimeter
  - Tile Calorimeter
  - Muon Spectrometer
  - Trigger/DAQ
- Goal: Combine strong core and subsystem software roles to closely couple core development to real-world testbeds and applications
  - Recognized in ATLAS as very important

Subdetector Software Activities



- Performance/design studies – All
- G3 based simu – All
- Test beam – Si, LAr, Tile
- Athena integration – Si, LAr, Tile, Muon
- Reco dev in C++ - Si, LAr, Tile, Muon
- G4 based simu dev – Si, TRT, LAr, Muon
- G4 physics validation – Si, LAr
- XML based det description – TRT, Muon
- Database – LAr, Tile, Muon

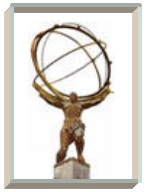
Common Projects



A few recent developments on common projects…

- Gaudi! Collaboration with LHCb on framework has been extremely valuable to date. See David Quarrie's talk.
- XML based detector description. Cross-experiment workshops organized by S. Goldfarb; prototype common effort with LHCb initially on Materials description
- ROOT event I/O prototype to be implemented in Athena
- ROOT analysis tool in use and interfaced to Athena
- Event Data Model enhancements partially based on D0 event store software
- JAS Java-based analysis tool (T. Johnson, SLAC) to be integrated with Athena
- Grid work

Schedule



- Ongoing program **now** of deliverables requiring a robust software development program
- Integrated, comprehensive schedule being developed in concert with WBS and with ATLAS-wide input
  - Linked to WBS throughout
  - Supports, but does not yet show most linkages between tasks/milestones
- Reasonable detail for next 1-2yrs; sketchier beyond that
- WBS and resource loaded schedule are input to the U.S. ATLAS project management accounting and tracking system
- Microsoft Project version (e.g. for Gantt charts) autogenerated
- Included in your package (full schedule, major milestones)

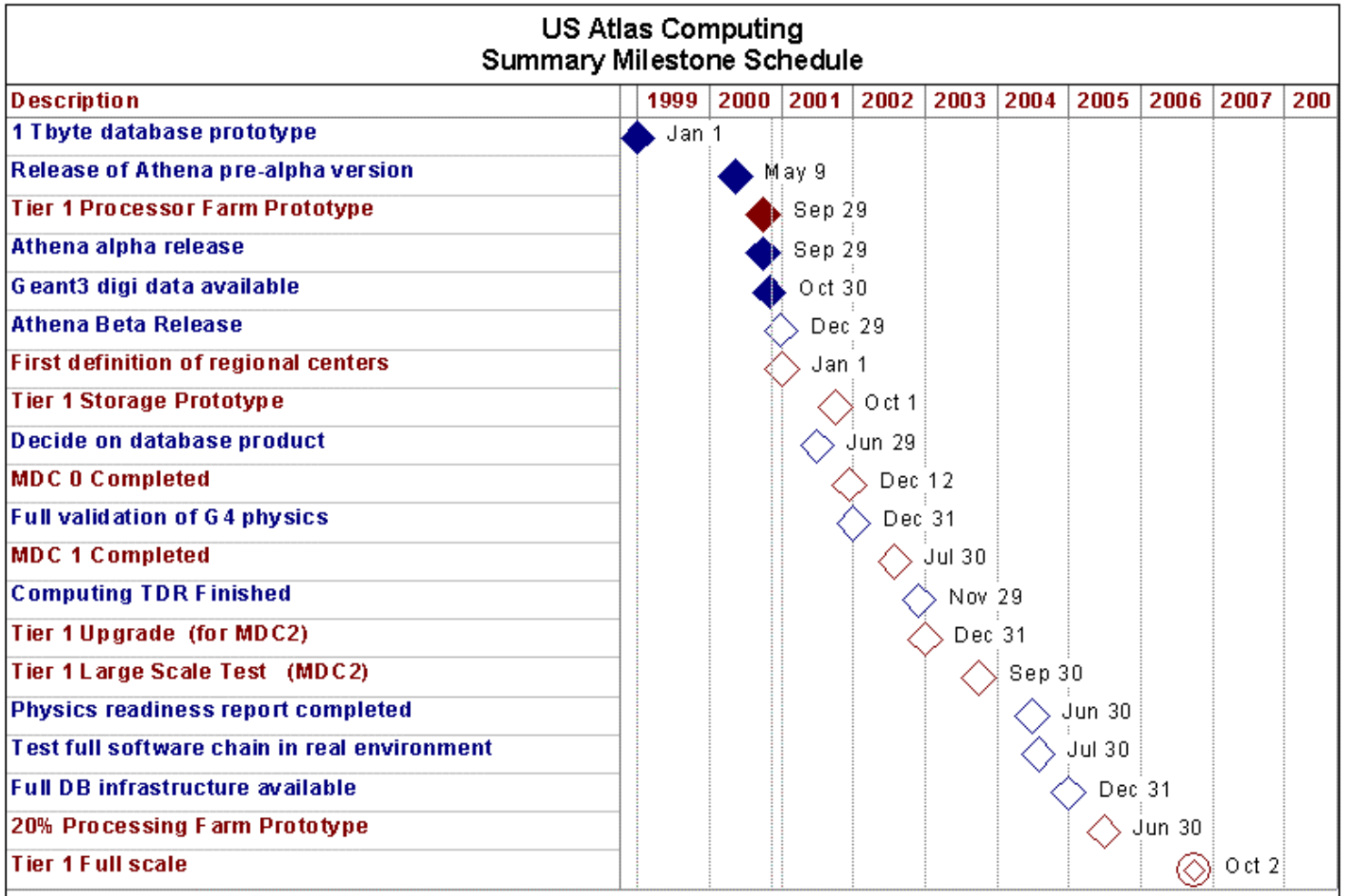
Computing Schedule

Created Mon Nov 13 17:17:51 GMT-0500 (Eastern Standard Time) 2000

For expired items: Green = done, Red = not done. Major milestones in **bold**.

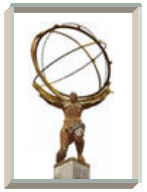
Date	End	Description	WBS ID	ID
1999/1/1	**Milestone**	**1 TByte database prototype** Keys: ms db major atlas WBS name: /sw/core/db **Done!** This is the famous '1TByte milestone' which was an ATLAS (and RD45?) milestone. In any case, it has been MET!	2.2.1.3	
1999/1/4	2000/6/30	TRT test beam geometry in G4 Keys: trt tbeam atlas WBS name: /sw/simrec/trt/tbeam **Done!** Stand-alone TRT test beam simulation, geometry of straws, radiators and reference detectors, for G4 Physics studies (ionisation and transition radiation)	2.2.2.3.6	
1999/1/4	2000/8/31	TRT test beam simulation in G4 Keys: trt tbeam atlas WBS name: /sw/simrec/trt/tbeam Geometry exists, digitisation started. A stand-alone program	2.2.2.3.6	
1999/4/1	1999/7/30	Tilecal test beam data in Objy Keys: tile tbeam db atlas WBS name: /sw/simrec/tile/tbeam **Done!**	2.2.2.5.6	
1999/7/1	2001/12/21	Geant4 physics studies Keys: simu geant4 physics atlas WBS name: /sw/simrec/general/g4 This refers to the tuning/checking of Geant 4 simulation of ATLAS detector response. This will go on for a long time. But one can see several stages: 1) 'stand-alone' G4 studies, using 99 and 00 test-beam data for the Oct 2000 Sim w/shop. 2) Further studies of this type for the ATLAS Phys. w/shop in early 2001. 3) G4 studies, from within new Framework. Dario Barberis (for ID) sees calendar 2000 for sorting out the em problems on dEdx and TR, and work on hadronic interactions in ID extending through 2001. For the muon system the 99 test-beam data (X5) is not well described by G3, but is described by FLUKA. G4 studies awaited with interest.	2.2.2.1.2	
1999/8/2	2000/12/21	Checks of G4 EM physics Keys: g4 simu atlas WBS name: /sw/simrec/general/g4 Mainly dE/dx and Transition Radiation. Several models in G4 to be compared to test beam data. Tuning may be needed as models have many parameters.	2.2.2.1.2	

Summary Milestone Schedule



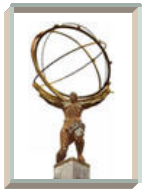
Software in blue

Budget and Personnel



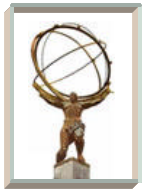
- In the software, budget = personnel to a good approximation
- Pre-FY01 priorities:
  - Control/Framework: Build-up at LBNL supporting A Team efforts achieved
  - Databases: Build-up supporting database leadership at ANL only beginning now
  - Support: Librarian associated with Tier 1 center at BNL

FY01 Software Budget



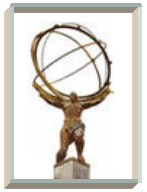
- Original goals:
  - Sustain control/framework effort (requires supporting personnel carried in FY01 on lab internal funds)
  - Establish critical mass in the database effort
  - Complement lab-centric core effort with university support at subdetector-core interfaces
- Agency guidelines:
  - Funding is included for core software (frameworks, controls, databases). An appropriate fraction will be dedicated to integrating physicist produced software
  - Main support for detector specific and general use software will derive from physicists in the base programs
  - Guideline funding levels for FY01 and beyond
- Response: retrenchment!
  - Plan pared back to the core software essentials which consume the guideline funding levels
  - Lack of detector specific component will particularly impact universities

FY01 Budget Guidelines



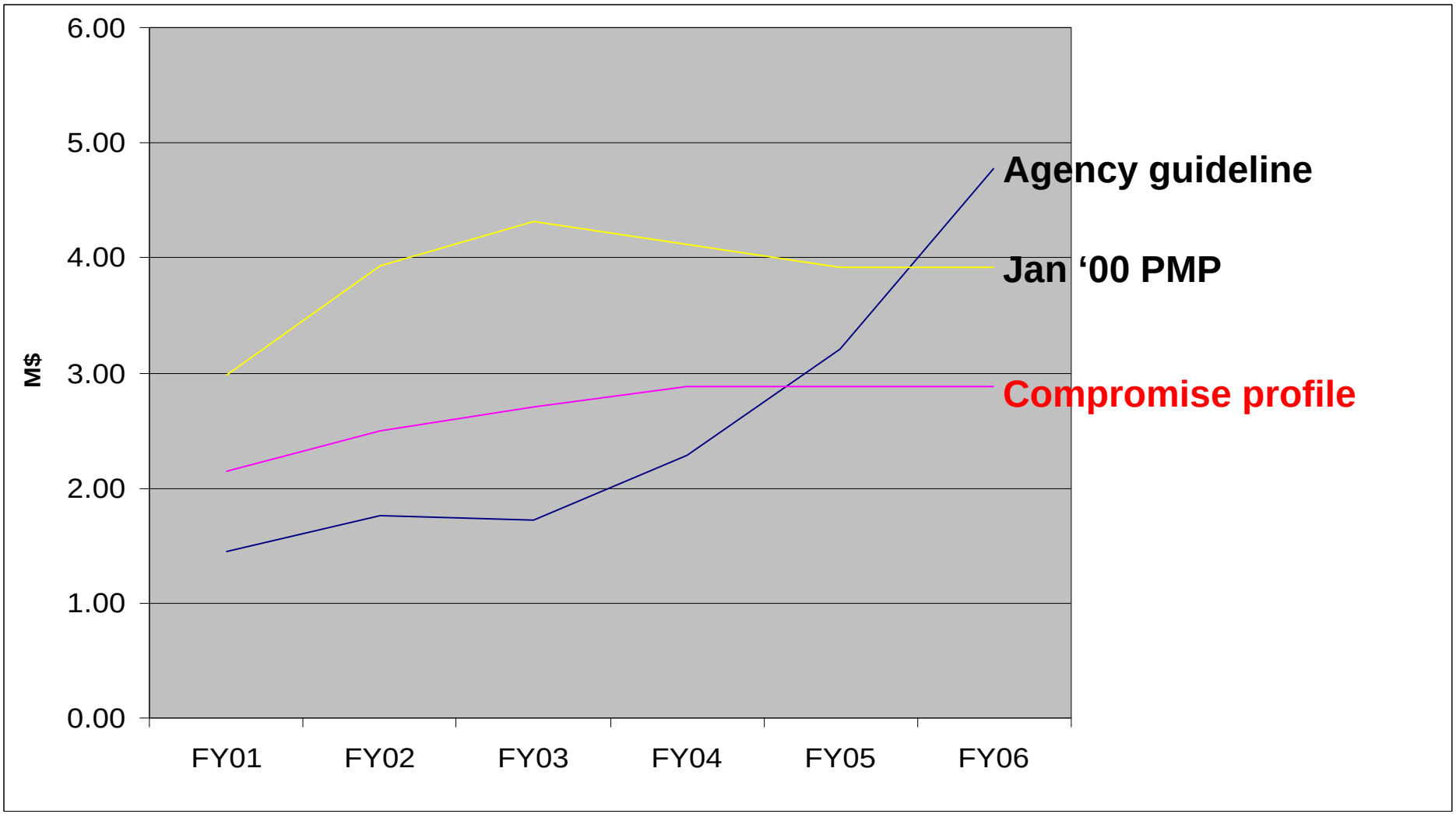
- Even with retrenchment, the profile of monies in software FY01-06 is an *impossible* one for software (not too strong a word)
  - Its extremely sharp and late peak looks like the profile of a failed project:
    - Neglected in crucial developmental years with an attempt to redress in late years by throwing personnel at the problem
- We developed an FY01 distribution respecting the profile, but it
  - Fails to sustain the control/framework effort
  - Fails by 2 FTEs to establish a 3FTE database critical mass
  - Consequently impacts programs and deliverables as later speakers will document
- And at least as seriously, it would result in the loss of valuable HEP expertise developed in current generation projects through inability to support existing personnel

Compromise Profile



- *Respecting the guideline funding integral through FY06,* we have developed a 'compromise profile' – well below the 'preferred profile' presented in our January draft PMP – which provides the needed gradual personnel build-up consistent with our deliverables and the preservation of our experience base
- Post-startup: Flat (within error bars) software funding expected for ~2 years into operations era
  - *Sustain software development capability during post-startup ramps in user base and luminosity*

Funding Profile Comparisons



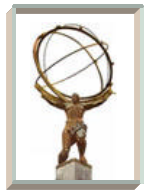
Personnel Mgmt

Created Mon Nov 13 17:26:42 GMT-0500 (Eastern Standard Time) 2000

Funding sources: P: Project, B: Base program
PHY: Physicist; AITP: Advanced IT Professional; ITP1/2: IT Professional 1/2
WBS activity FTE fractions down to level 4 (3 deep in the mnemonic name hierarchy) are added up in the rollup, and should sum to the total effort level. FTE fractions below level 4 are for informational purposes only and are ignored for purposes of rollup.

Name	Institute	Resource	Funding, activities (by WBS area) [year / fte fraction]						
Shupe	Arizona	PHY	**source-B**: /sw/simrec/backgd:						
AnlHire1	ANL	ITP2	**source-P**: /sw/core/db:		**1/0.75** 1/0.66	**2/1.0** 2/1.0	**3/1.0** 3/1.0	**4/1.0** 4/1.0	**5/1.0** 5/1.0
AnlHire2	ANL	ITP2	**source-P**: /sw/core/db:		**1/1.0** 1/1.0	**2/1.0** 2/1.0	**3/1.0** 3/1.0	**4/1.0** 4/1.0	**5/1.0** 5/1.0
LeCompte	ANL	PHY	**source-B**: /sw/simrec/tile: /sw/simrec/tile/db:	**0/1.0** 0/1.0	**1/1.0** 1/1.0	**2/1.0** 2/1.0	**3/1.0** 3/1.0	**4/1.0** 4/1.0	**5/1.0** 5/1.0

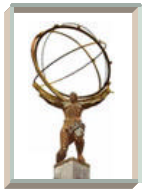
Planned & Required Effort Levels



FTEs by FY	FY01	FY02	FY03	FY04	FY05	
Arch/Frame	7.0	6.3	6.2	6.1	6.4	Needed
	6.0	5.9	6.4	6.4	6.4	U.S. provided
DB/Data mgmt	14.6	15.8	18.3	16.5	18.5	Needed
	5.5	6.9	7.4	8.3	8.3	U.S. provided

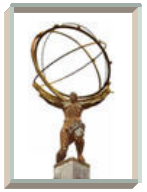
Needs based on bottom-up estimate of Int'l ATLAS needs from WBS level 5. Developed by U.S. software managers based on experience (developed by one of us, reviewed by other two; revisions were small). Broadly consistent with International ATLAS estimates.

Summary



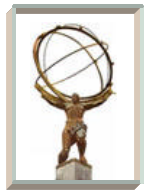
- Strong core program in control framework and architecture, with aggressive milestones met, good ATLAS acceptance, and direction provided from the U.S. grounded in a results-directed development (coding!) effort
  - Corollary benefits to and from U.S. subsystem-centric efforts
    - Early use, testing, evaluation and participation in guiding further development
- Database effort has lagged, leaving our leadership role with an inadequate complement of developers to drive a similarly results-directed effort
  - ATLAS *urgently* needs the expertise and leadership we can provide
  - Now being addressed, but slowly…
- Integral funding guidelines out to ’06 almost consistent with a core software directed program
  - Exclusion of subdetector software necessitates proper coverage in the base program
- However, a smoother year to year distribution as in our compromise profile is needed to meet our commitments and to preserve our expertise base

Supplementary Slides



- Supporting material follows, which will not be shown in the talk unless prompted by questions and discussions
  - Budget/personnel issues
  - Subdetector activity summaries (see J. Shank talk for detail)

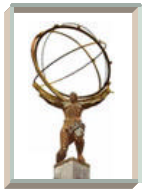
FY00 Core Software Personnel



Grey = not yet achieved

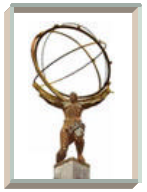
	ANL	LBNL	BNL	U of Michigan
Control/Framework SW Professionals		C. Tull 1.0 D. Quarrie 0.5 (0.8) C. Day 0.67 (1.0) New Hire 0.67 (1.0) J. Milford 0.25 (0.5)		
Control/Framework Physicists		I. Hinchliffe 0.5 M. Shapiro 0.2 P. Calafiura 0.6 C. Leggett 0.6	T. Wenaus 0.2	
Data Management SW Professionals	D. Malon 1.0 G. Pandola 0.25 (0.5) J. Christiansen .25 (.5) New Hire 0.5 (1.0) (.5 achieved – E. Frank)		New Hire 0.5	New Hire 0.5
Data Management Physicists	T. LeCompte 0.5 E. May 0.6 R. Wagner 0.5 R. Blair, L. Price, and others 0.4		S. Rajagopalan 0.5 S. Protopopescu 0.1 S. Snyder 0.1	S. Goldfarb 1.0 (muon subsystem)

Other Professional Support in FY00



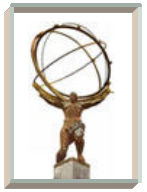
- Subsystem software development
  - WBS 2.2.2.3 - LAr simulation and reconstruction
    - W. Seligman, 1 FTE, Nevis Lab
  - WBS 2.2.2.4 - Tilecal simulation and reconstruction
    - E. Frank, .5 FTE, U Chicago (other .5 on DB)
- U.S. ATLAS software support
  - WBS 2.2.4 – Software Librarian
    - S. Efstathiades, 1 FTE, BNL

FY01 Profile for Guideline Budget



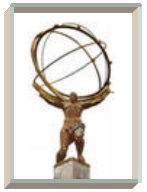
Profile consistent (almost) with revised total funded effort (agency guideline) for FY01		
	M$	FTE
Total funded effort	1.45	
Total of below	1.51	6.8
Core - Control/Architecture		
C. Tull (LBNL) - A Team	0.24	1.0
D. Quarrie (LBNL) - Chief Architect	0.19	0.8
C. Day (LBNL) - architecture	0.00	0.0
P. Calafiura (LBNL) - A Team	0.10	0.5
C. Leggett (LBNL) - framework	0.00	0.0
M. Marino (LBNL) hire - framework	0.20	1.0
S. Qian (BNL) - event model, framework integration	0.10	0.5
Control total	**0.83**	**3.8**
Core - Data management		
D. Malon (ANL) - Database Co-Leader	0.24	1.0
D. Blachowicz (ANL) - database development	0.10	0.5
E. Frank (U Chicago) - database development/tilecal (*)	0.15	0.5
ANL hire - database development	0.00	0.0
Data management total	**0.49**	**2.0**
Support, management, training etc.		
Librarian	0.15	1.0
Training/tools	0.04	
Support etc. total	**0.19**	**1.0**
(*) Presently 100% project funded, 50% on core software (database), 50% on tile calorimeter		

Silicon Pixel Tracker



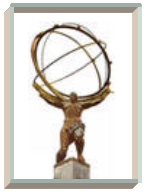
- L. Vacavant/LBNL et al.
- Integration of Kalman based reconstruction in Athena underway
  - Geometry and digits redesigned and interfaced; output classes defined; tested on single tracks
  - Starting now: commit to repository this week; tests on full events; design iteration (modularity)
- Pixel test beam simulation in Geant4
  - Digi chain redesigned for modularity and implemented in G4
  - Now starting: G4 physics validation against G3 and test beam
- Tracking performance: studies of FE electronics performance impact ongoing

Transition Radiation Tracker



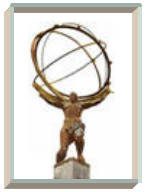
- F. Luehring: TRT SW coordination, Inner Detector (ID) simu coordination, ID Geant material coordination
- TRT Geant3 simulation maintenance
- Rate studies of beam pipe designs led to all-Be design selection (Geant3)
- Participating in G4 barrel geometry development
- Near term:
  - Updated TRT signal shapes into G3 digitization
  - TRT detector description in XML
  - TRT digitization into Geant4 (K. Assamagan/Hampton, F. Luehring/Indiana)

LAr Simulation



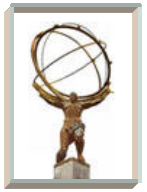
- LAr simulation coordination: M. Leltchouk/Nevis
- Participation in G4 EM barrel development
  - Major int'l effort, now in test beam/G3 comparisons
- Coordination of HEC into G4 (w/Montreal, Munich)
- FCAL test beam, G3, G4 comparison studies (P.Loch Arizona, R. Mazini Montreal)
- Near term:
  - LAr offline data class design (BNL, Nevis, Int'l)
  - Geant4 integration into ATLAS
  - Geant4-ATLAS test beam comparison project
    - Long way to go on G4 physics validation

LAr Reconstruction



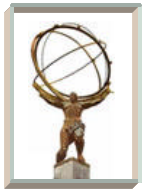
- LAr reconstruction coordination: S. Rajagopalan/BNL just appointed
- OO LAr reconstruction development (H.Ma, S.Rajagopalan/BNL, J.Schwindling, M.Weilers)
  - Released 4/2000, most Atrecon features preserved
  - Very good agreement with Fortran Atrecon results, event level, barrel and endcap
- Athena integration 4-5/2000
  - First major application integrated in new framework; basis for tutorial, A Team feedback
- HEC reconstruction being incorporated
- Near term:
  - FCAL reconstruction
  - Application in LAr EM test beam analysis
  - Integration with Tile Calorimeter reconstruction

Tile Calorimeter



- Tile Calorimeter DB coordination: T. LeCompte/ANL
- Tile Cal reconstruction coord: F. Merritt/Chicago
- C++ test beam software ‘Pilot’ now has all functionality of old Fortran
- Optimal Filtering (correcting pulse height for phase of signal relative to beam) implemented
- C++ based reconstruction in development; G3 digit information being used
  - First jet finding algorithm in use
- Near term:
  - Pilot into Athena framework
  - Tile test beam data into Objectivity & Athena
  - Pursuing a common C++ high level class design with LAr

Muon Spectrometer



- Boston U (J.Shank), U Michigan, Harvard, BNL
- Current activity:
  - Muon database and detector description
    - Muon DB coordination: S. Goldfarb/UM
    - Digit decoding into ATLAS Event from G3 complete -- except for CSCs
      - Detector element Identifiers implemented
    - XML detector description: MDTs, RPCs, TGCs implemented; full chain to Geant4 implemented
      - Geometry ID scheme for all subsystems defined and documented
  - OO muon reconstruction (Moore) development
    - New program based on components of 1st generation OO reco (Amber)
    - Integrated into Athena; in repository; in early development
  - Muon L2 trigger simulation studies, code support
  - Simulation for detector layout optimization
- Near term:
  - Completion of cathode strip chamber software
  - Trigger TDR studies: L1->L2 rejection, efficiencies
  - Calibration DB, trigger DB, ongoing detector description work

Software Project Personnel By Year

Created Mon Nov 13 17:33:36 GMT-0500 (Eastern Standard Time) 2000

Only project funded people are shown

Name	Institute	Major WBS's	FY01	FY02	FY03	FY04	FY05	FY06
AnlHire1	ANL	/sw/core/db	0.75	1.0	1.0	1.0	1.0	1.0
AnlHire2	ANL	/sw/core/db	1.0	1.0	1.0	1.0	1.0	1.0
Malon	ANL	/sw/core/db /sw/core/frame	1.0	1.0	1.0	1.0	1.0	1.0
Efstathiades	BNL	/sw/support/librarian	0.0	0.0	0.0	0.0	0.0	0.0
Fine	BNL	/sw/core/db /sw/simrec/lar	0.0	0.0	0.0	1.0	1.0	1.0
Perev	BNL	/sw/core/db	0.0	0.0	0.8	1.0	1.0	1.0
Qian	BNL	/sw/core/event /sw/support/qa /sw/support/librarian	1.0	1.0	1.0	1.0	1.0	1.0
Undrus	BNL	/sw/support/librarian /sw/support/help /sw/core/event /sw/simrec/lar	1.0	1.0	1.0	1.0	1.0	1.0
Vanyashin	BNL	/sw/core/db	0.0	1.0	1.0	1.0	1.0	1.0
BostonHire1	Boston	/sw/simrec/general	0.66	1.0	1.0	1.0	1.0	1.0
Frank	Chicago	/sw/core/db /sw/simrec/tile	1.0	1.0	1.0	1.0	1.0	1.0
Seligman	Columbia	/sw/simrec/lar	1.0	1.0	1.0	1.0	1.0	1.0
HarvardHire1	Harvard	/sw/core/db	0.66	1.0	1.0	1.0	1.0	1.0
HarvardHire2	Harvard	/sw/core/db	0.5	1.0	1.0	1.0	1.0	1.0
Calafiura	LBNL	/sw/core/frame /sw/core/event	0.5	0.5	0.5	0.5	0.5	0.5
Day	LBNL	/sw/core/frame /sw/core/arch	0.5	0.5	0.5	0.5	0.5	0.5
Leggett	LBNL	/sw/core/frame	0.5	0.5	0.5	0.5	0.5	0.5

Marino	LBNL	/sw/core/frame	1.0	1.0	1.0	1.0	1.0	1.0
Quarrie	LBNL	/sw/core/frame /sw/core/arch	0.8	1.0	1.0	1.0	1.0	1.0
Tull	LBNL	/sw/core/frame	1.0	1.0	1.0	1.0	1.0	1.0
Total Project FTEs			**12.87**	**15.5**	**16.3**	**17.5**	**17.5**	**17.5**
Total Activity FTEs (incl. base):								
Frame/Arch/Event FTEs			6.0	5.9	6.4	6.4	6.4	6.4
DB/Data mgmt FTEs			5.47	6.9	7.4	8.3	8.3	8.3
SW Support FTEs			1.3	1.3	1.3	1.3	1.3	1.3
Simu/Reco FTEs			2.16	2.5	2.5	2.5	2.5	2.5

Contact

Estimate of Architecture (WBS 2.2.1.1) and Framework (2.2.1.2) effort needs for ATLAS

Modified Monday, November 13, 2000 10:50:08

Estimated FTE totals by fiscal year required by the indicated WBS item for International ATLAS.

FY 01	FY 02	FY 03	FY 04	FY 05	WBS item
0.4	0.4	0.4	0.4	0.4	/sw/core/arch/chief
0.1	0.1	0.1	0.1	0.1	/sw/core/arch/proto
0.5	0.5	0.5	0.5	0.5	/sw/core/arch/usdp
0.2	0.2	0.2	0.2	0.2	/sw/core/frame/frame
0.2	0.2	0.2	0.2	0.2	/sw/core/frame/module
0.2	0.2	0.0	0.0	0.0	/sw/core/frame/jobopts
0.5	0.5	0.2	0.2	0.5	/sw/core/frame/intfc
0.5	0.5	0.5	0.5	0.5	/sw/core/frame/persistent
0.5	0.5	0.5	0.5	0.5	/sw/core/frame/transient
0.5	0.2	0.2	0.2	0.2	/sw/core/frame/conddb
0.3	0.1	0.1	0.1	0.1	/sw/core/frame/desc
0.2	0.2	0.1	0.1	0.1	/sw/core/frame/message
0.5	0.2	0.2	0.2	0.2	/sw/core/frame/stat
0.3	0.3	0.3	0.3	0.3	/sw/core/frame/analysis
0.2	0.2	0.2	0.1	0.1	/sw/core/frame/graphics
0.3	0.3	0.3	0.3	0.3	/sw/core/frame/config
0.2	0.0	0.0	0.0	0.0	/sw/core/frame/particle
0.5	0.5	0.5	0.5	0.5	/sw/core/frame/tools
0.1	0.1	0.1	0.1	0.1	/sw/core/frame/tbeam
0.2	0.3	0.7	0.7	0.7	/sw/core/frame/dist
0.0	0.2	0.3	0.3	0.3	/sw/core/frame/prod
0.2	0.2	0.2	0.2	0.2	/sw/core/frame/collab
0.2	0.2	0.2	0.2	0.2	/sw/core/frame/test
0.2	0.2	0.2	0.2	0.2	/sw/core/frame/doc
7	6.3	6.2	6.1	6.4	**Arch/Framework Totals FY01-05**

Contact

Estimate of Database (WBS 2.2.1.3) effort needs for ATLAS

Modified Monday, November 13, 2000 10:50:08

Estimated FTE totals by fiscal year required by the indicated WBS item for International ATLAS.

FY 01	FY 02	FY 03	FY 04	FY 05	WBS item
0.3	0.3	0.3	0.2	0.2	/sw/core/db/design
1.0	0.7	0.5	0.0	0.0	/sw/core/db/eval
2.0	2.0	2.0	1.0	1.0	/sw/core/db/eventdb
0.5	0.5	1.0	1.0	1.5	/sw/core/db/metadata
1.0	1.0	0.5	0.5	0.5	/sw/core/db/simu
1.0	0.5	0.5	0.5	0.5	/sw/core/db/reco
1.0	1.0	1.0	1.0	1.0	/sw/core/db/tbeam
0.5	0.5	1.0	1.0	1.5	/sw/core/db/analysis
0.2	0.2	0.3	0.3	0.3	/sw/core/db/tdaq
0.8	0.5	1.0	1.0	1.0	/sw/core/db/conddb
0.7	0.5	0.2	0.2	0.2	/sw/core/db/frame
2.0	2.0	2.0	2.0	2.0	/sw/core/db/db
0.2	0.4	0.5	0.5	0.5	/sw/core/db/security
0.5	0.5	0.5	0.5	0.5	/sw/core/db/support
0.3	0.5	0.5	0.5	1.0	/sw/core/db/help
0.5	1.5	1.5	1.5	2.0	/sw/core/db/dist
0.7	0.7	1.0	1.0	1.0	/sw/core/db/grid
0.3	0.7	0.7	0.5	0.5	/sw/core/db/scale
0.2	0.6	1.0	1.0	1.0	/sw/core/db/admin
0.1	0.2	0.2	0.2	0.2	/sw/core/db/prod
0.2	0.2	0.2	0.2	0.2	/sw/core/db/collab
0.2	0.4	1.5	1.5	1.5	/sw/core/db/access
0.2	0.2	0.2	0.2	0.2	/sw/core/db/test
0.2	0.2	0.2	0.2	0.2	/sw/core/db/doc
14.6	15.8	18.3	16.5	18.5	**DB Totals FY01-05**